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Research article

Therapy through Social Medicine: Cultivating Connections and Inspiring Solutions for Healthy Living

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Abstract: ***Objective:*** This paper is to identify key areas where healthy living may be improved in India, and the converse, through cultivating connections at government, community, and at individual levels. ***Methods and Materials:*** Key healthy living issues for India were selected and relevant evidence obtained from internet sources together with personal experience over decades of multi- and inter-disciplinary international research activities. ***Approach*:** Key activities of connectivity in the development of Indian healthcare arising from "Methods and Materials" were evaluated. These included, the UN Millennium Development Goals, government-private interaction for healthcare benefit, family planning, Modicare 2015, women in society, business and clinical strategies, infrastructure, building "families", fish stocks preservation, ecological epidemiology, NCDs, and transgenesis. ***Results:*** In a nutritional context, "education for all" leading to connectivity and a pragmatic inspirational approach to understanding complex issues of population dynamics is essential. Of importance are scientific endeavours in agriculture and aquaculture, water utilization,

food manufacture, complex issues of supply and demand at an economic eco-friendly and sustainable level, chemoprevention and treatment of diseases (where nutritionally applicable) such as with functional foods: all of which are so vital if one is to raise standards for healthy living in this century and beyond. Developing-India could be a test-bed for other countries to follow, having both the problems and professional understanding of issues raised. By 2025, the UK's Department for International Development programme in India aims to promote secondary school education for young girls, *i.e.*, extending the age of marriage, and interventions that will lead to better health and nutrition, family planning, and developing skills for employment; and supporting India's "Right to Education Act". The outcome may result in smaller better-nourished higher-income families. Computer school networks at Nosegay Public School in Moradabad and the municipal authorities, there, aim to reduce the consumption of unhealthy foodstuff dictated by personal convenience, media influence, and urban retail outlets and promotions. The Tsim Tsoum Institute has advocated the adoption of the Mediterranean/Palaeolithic diet with its high omega-3: omega-6 fatty acid ratio aimed at an improvement in global health due to an expected reduction in the epidemic of pre-metabolic disease, type 2 diabetes and cardiovascular disease [1,2]. Tomorrow, low-cost computer apps are advocated as a driving force in the selection of healthy foods, grown/produced under environmentally safe conditions, within retail outlets for use by mothers with limited budgets that may lead to a revolution in retail management and policy. Chemo-preventive prospective strategies such as those involving polyphenols, lignans, (found in fruits, vegetables, and soya) and other natural phytochemical products, and functional foods, which balance benefit and risk of disease, need to be continually developed, especially to reduce breast and prostate cancer. ***Conclusion:*** There is an opportunity to make nutrition a central part of the post-2015 sustainable human and agricultural development agenda for the The Expert Panel for the UN 2030 programme to consider. Solutions for cultivating connections and inspiring solutions for healthy living in India have included all the above issues and this swathe of actions, some within the Nagoya protocol, has been presented for the purpose of contributing towards the health of India.

Keywords: India; connectivity; DALY; UN millennium development goals; government-private model of healthcare; family planning; modicare 2015; NCDs; women in society; infrastructure; ecological epidemiology; chemoprevention; transgenesis

1. Introduction

This article focuses on selective connections which have been cultivated in India through inspirational endeavours to generate increased healthy living amongst the populace. This introduction is divided itself into sub-sections of relevant interest as a prelude to the key main issues under scrutiny. The connections, which are selective because societal activities and their impact on

health are immense, illustrate principles and actions which have measured success. Before discussing these key connections it is worthwhile to remember some basics.

1.1. Food

Lest we forget [3,4], it is adequate food and clean water [5] which is absolutely essential to healthy living [6,7]. From a nutrition perspective, the amount of protein needed is different in health (*c*1.2 g/kg/d), in disadvantaged populations (e.g. living in urban slums, or belonging to sedentary rural (a third do not have adequate intake lysine levels) and tribal groups) and in those with illness: the latter may experience a deficit of 40% [8] of protein. This protein level, required for healthy living, of which three fifths comes from cereals [9], needs qualification as to its digestibility and its corrected amino acid score based on lysine which is often limited in availability, and by a quality measure, which is given by the protein: energy ratio. It is important to take cognisance of India's population having a low BMI compared with the Western populations, and individuals are often deficient in other dietary constituents such as minerals, vegetables and fruit.

1.2. Water

Access to adequate clean water is a major but improving problem, with contaminated water supplies (sewage, agricultural run-off and industrial effluent), and therefore limits good personal hygiene and latrine availability, and leads to the spread of communicable diseases. Near the big cities in India, vegetables are often grown using sewage water irrigation and are contaminated with disease-causing microorganisms e.g. *E. coli.* Vegetables grown in sewage water should be thoroughly washed with clean water and also inspected for microorganisms. Monitoring should also be a key activity in horticulture so that fruits and vegetables sprayed with insecticides and fungicides should be properly inspected prior to marketing. Many insecticides and fungicides have mutagenic and cancer-causing potential. Water Demand Management [10], with adequate funding, brings about changes in policies, practices, and uses, making water a more sustainable vital resource to the rural and urban populations. With support from the World Bank, safe sustainable water can be delivered to these consumers cost-effectively. This requires stakeholders to think in qualitative and quantitative terms, viz. equity, opportunity, security, efficient water management, waste reduction, etc., whilst augmenting exogenous supplies, subject to location and availability, leads to cost effective ways to provide water supplies to a large number of people in a more sustainable manner. India should continue with its rain water collection by building rivulet dams, water reservoirs, so as to collect water during the Monsoon season, which can be used for aquaculture and irrigation purposes. Every year the water table is going down-and-down particularly in the Provinces of Punjab and Haryana due to extensive tube well irrigation. However, it is realised that the improvement of water supply is complex: in the urban areas such as Kolkata Municipal Area, population *c*14–15 million, the social

groups (Economically Weaker Social Group (dwellings: slum, shanty, jhaupris, pucca): earning < 1000Rs per capita per month) water needs and locations must be identified. For example, about three quarters of this city population belong to this weaker economic group of which about a third live in slums and approximate needs are 44 (non-slum) and 15 (slum) gallons per capita per day.

Economic costs can be estimated from total water supplies, and municipal stand-posts, and water use, and wastage. Any social therapy should be focussed on the household size and need, literacy, constancy of supply, pollution, and accessibility, unemployment, water payments, and geographic dispersion and their impact on child labour, employment, mental health and happiness which are beyond the remit of this article but have been addressed by Chakraborty [10]. The role of the Indian Government through its directorate of National Vector Borne Disease Control Programme for the prevention and control of vector borne diseases [11], viz. malaria, dengue, lymphatic filariasis, kala-azar, Japanese encephalitis and chikungunya is outside the remit of this paper; as are the control of human tuberculosis, HIV/AIDS, leprosy, and integrated disease surveillance.

1.3. Population

Of particular concern to the authors stem from the quotation from Tertullian "What most frequently meets our view (and occasion complaint) is our teeming population. Our numbers are burdensome to the world, which can hardly support us.... In very deed, pestilence, and famine, and wars, and earthquakes have to be regarded as a remedy for nations, as the means of pruning the luxuriance of the human race." Despite the efforts of many, global population growth does not necessarily depend on the total resources available [12]: but the scarcest, limiting, resource necessary for healthy living is wrongly attributed/enunciated by Liebig's "Law of the Minimum" as first suggested by the agricultural scientist Carl Sprengel [13] and illustrated by Dobeneck's [14] barrel of unequal length staves. The increasing availability of food drives the population upward overshooting an acceptable level of carrying capacity with later prospects of such carrying capacity being degraded. Legalised or incentivised birth control such as that which was practiced in China may be useful, *ceteris paribus*, but this is not a topic for this paper but the "Results" section of the abstract has the phrase "education for all" and at the very least this should include a programme to curtail uncontrolled reproduction, particularly for young women [15].

1.4. Psychology

One noticeable feature amongst the global population is that man and animals, living in the wild [16], do not generally suffer from overweight but societal man, and animal husbandry and pets do tend to be overweight and it is logical to think of obesity as a disease of the mind and therefore can be, and is, influenced for good or otherwise by applied psychology and nutrition, which are some of the tools at our disposal today. So cultivating connections and inspiring solutions for healthy

living must include psychologists: the mind perhaps being the primary factor for disease rather than food which is important and in some respects secondary depending on perspective [17].

1.5. Pollution

Stopping tobacco smoking should also be a major concern for all, particularly the young, since no form of tobacco smoking is safe, irrespective of the device used for tobacco smoking, e.g. filtered or non-filtered cigarettes, bidis (a popular South Asian cigarette), pipes, or cigars, all have similar risks for causing myocardial infarction. Air pollution from automobiles is improving but much more needs to be done to reduce respiratory and other diseases. Attention to indoor pollution from home and retail dwellings should be addressed e.g. ventilation, or alternative sources of appliances and fuel should be used to reduce associated diseases e.g. Chronic Obstructive Pulmonary Disease (COPD). Intertwined with all of these social policies under the "therapy" umbrella is, of course, "climate change" which is a gargantuan task and beyond the remit of this article.

1.6. Mental Health and Happiness

Beyond seeking solutions for developing the economy, and tackling the problems of communicable and non-communicable diseases, Minister Chouhan, a member of Narendra Modi's BJP's party and India's first Ministry of Happiness [18] intends to strive for "putting a smile on every face", to combat increasing suicides such as those amongst Madhya Pradesh farmers and those in the Punjab and Uttar Pradesh, afflicted by drought, by overseeing social programmes including yoga, spirituality, meditation and the arts, as well as offering free religious pilgrimages for senior citizens: and promoting the "girl child" programme facilitating longer education for girls: this follows the UAE [19] (Ohood Al Roumi, UAE Minister of State for Happiness) to improve India's 118^{th} world ranking which takes account of GDP per capita, life expectancy, social support and freedom to make life choices as indicators of happiness. This is the social therapy based on the selected social medicines, but how can this be achieved?

1.7. Selective connections

These comprise (1) UN millennium development goals for India; (2) Social therapy through inspiration; (3) The role of women in society, agriculture, medicine, family welfare, ownership; (4) Connectivity and non-communicable diseases; (5) Strategic thinking: initiatives, monitoring progress, realistic targets, and deliverables; (6) GIS and planning permission and ecological epidemiology; (7) Transgenesis, epigenetics, foeto-placental development and lifetime risk of non-communicable diseases such as cardiovascular disease, type 2 diabetes, metabolic syndrome, etc.; (8) and (Narendra) Modicare.

The information access/target for selected connections is briefly described under "Methods and Materials" (Sections 2.1–2.8), and corresponding "Results" (3.1–3.8) follow. There cannot be a utopian model to cure the ills of global human health or that in India. However, in consideration of the issues, the "Discussion" and "Conclusion" contain selected examples on a macro-, community-, and individual-scale towards cultivating connections and inspiring solutions for healthy living in India.

2. Methods and Materials

Access to these materials was by "Internet Searching" based on "Google" search engines and on-line databases mainly at Durham University, and from expertise and knowledge from authorship. What follows is largely descriptive.

2.1. UN Millennium Development Goals for India

In 2000 [20], 189 nations made a pledged to free people from extreme poverty and multiple deprivations. This pledge became the eight Millennium Development Goals (MDG) some with sub-targets to be achieved by 2015, viz. MDG1 (targets 1 & 2): to Eradicate Extreme Hunger and Poverty; MDG2 (target 3): Achieve Universal Primary Education; MDG3 (target 4): Promote Gender Equality and Empower Women; MDG4 (target 5): Reduce Child Mortality; MDG5 (target 6): Improve Maternal Health; MDG6 (targets 7 & 8): Combat HIV/AIDS, Malaria and Other Diseases; MDG7 (targets 9–11): Ensure Environmental Sustainability; MDG8 (target 18): Develop a Global Partnership For Development.

2.2. Social therapy through inspiration: The role of women in society; agriculture, medicine, family welfare, ownership

With dwindling fish stocks [21] (*q.v.* Kerala 1970–2002 baseline for 2003–2005 assessment,) many are in serious decline (e.g. sphyraena sp., Rastrelliger kanagurta even collapsed Arius sp.), and efforts, must be directed towards conservation through *in situ* and *ex situ* means, for example, ranching, aquaculture, establishment of marine reserves, gene banks, etc. which is beyond the scope of this article. However, the land is the major producer of food with millets the major crop in much of India but its use as human food has substantially given way to livestock fodder and alcohol production. Pulses, oilseeds, rice, sugarcane, wheat and barley etc. are other crops dependent on geographic location.

2.3. Connectivity and non-communicable diseases (NCD)

The preventative aims in India should be to coordinate national NCD efforts; to create a national NCD surveillance system; to develop financing strategies for NCD prevention and control; to evaluate

NCD programmes and policy initiatives; take an active role in regional collaboration e.g. standardizing and mandating food labelling policy to improve knowledge and awareness of food composition.

2.4. Strategic thinking: initiatives, monitoring progress realistic targets (e.g. NCDs) and deliverables

A review is needed of "failed" and successful initiatives with local and national institutions based on: research and associated methodologies, implementation of physical and dietary material, and relevant clinical and economic factors, networking, Public and Private initiatives (PPI), private and government departments, and education and training programmes, etc. In evaluating the economic progress on increasing the benefit, or otherwise, DALYs should be used which take into consideration years of premature life lost (YLL), years lost to disability (YLD) with associated calculations [22] and modifications [23]. Then to ask certain key questions "did the elements of the initiative, *in toto*, ever see 'light of day'?" "Were existing staff with expertise, at this and other sites, lost/gained as a result of initiative failure/success?" "What initiatives were salvaged or developed and disseminated into local/national initiatives?" "Why were some of these health promotion initiatives unsuccessful?" A synthesis of answers to these questions could be used as a springboard (signals) to resurrect failing policies with remedial changes. Undoubtedly the Modi government is enmeshed, elucidating, and providing solutions to these and other problems aimed at "Cultivating Connections and Inspiring Solutions for Healthy Living" and this forms the final section of the "Results" section.

2.5. NGOs: Building Families and Networks

The source of information on certified NGOs is vast even by state-by-state [24]. The authors have close contacts with several NGOs over many years and also have close ties with local government and schools networks in Moradabad and elsewhere.

2.6. GIS and planning permission. ecological epidemiology

The use of geospatial technologies and methods has great potential for health care in India [25] and must be part of the mainline strategic thinking of planners particularly disease surveillance and intervention and treatment strategies. The development of these technologies will probably be centred on the major cities where the professional integrated expertise lays, particularly in clinical epidemiology.

2.7. Transgenesis, epigenetics, foeto-placental development and lifetime risk of Non-Communicable Diseases such as cardiovascular disease, Type 2 diabetes, Metabolic Syndrome, etc

The source of information comprised evidence from Medline, personal collections of report material, discussion with peers which has considered the identification of candidate molecular structures derived from dietary plant-based foodstuff; the limitations of screening structures using cell and tissue culture techniques; dietary uptake, metabolism and mechanism of action for a range of diseases for candidate chemoprevention; and epigenetic mechanisms of action of dietary compounds. This is described elsewhere by these authors [26].

2.8. (Narendra) Modicare

As a starting point, the private healthcare industry is very approximately a $40 billion (Rs2,50,000 crore) industry in India and the private sector comprises 70–80% of total healthcare services. Indian private healthcare industry attracted $2 billion (Rs12,500 crore) in 2012–13. So potentially lucrative is it that "The International Finance Corporation", a private equity arm of the World Bank, claimed that India is the second most attractive destination in the world for its investment in health. What is needed is an integrated Government-private model system of care. Public healthcare is free for people below the poverty line but public healthcare services are just 20% of the total market; the rest is controlled by the private sector and so the general public is at the "mercy" of pricing dictated by the private healthcare service providers.

The new national government, which had promised "national health assurance," released a draft National Health Policy (NHP) in January 2015. As outlined by Reddy [27] this policy gives a right to health through parliamentary legislation subject to what the states can deliver, they being now in receipt of an increased tax revenue provision. The role of the NHP will strengthen connections between primary care services to provide comprehensive care, and furthermore will be connected to secondary and tertiary care services. Both public- and private-sector providers would be paid for by government-funded health insurance schemes but the final version of the NHP is yet to be adopted.

3. Results

3.1. UN Millennium Development Goals for India

The results to date [28] are published which show that although data vary from state to state the progress is encouraging and outlined briefly below [29].

MDG 1: Target 1: Halve, between 1990 (47.8%) and 2015, the proportion of people whose income is less than one dollar a day. Result: 21.9%, which shows that India has already achieved the target and a detailed analysis shows there has been an improvement in both rural and urban populations. Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger. In 1990, the proportion of under-weight children below 3 years was 52%. The target was that the proportion of under-weight children should decrease to 26% by 2015. The expected result for

2015 is 33% and falls short of target. The National Family Health Survey shows that, the proportion of under-weight children below 3 year declined from 43% in 1998–99 to 40% in 2005–06. At this rate of decline the proportion of under-weight children below 3 years is expected to reduce to 33% by 2015, which indicates India is falling short of the target. MDG2: Achieve Universal Primary Education, Target 3: Ensure that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary education. Result: At national level, the male and female youth literacy rate is likely to be at 94.81% and 92.47% respectively: moderately on track. MDG3: Promote Gender Equality and Empower Women Target 4: Eliminate gender disparity in primary, secondary education, preferably by 2005, and in all levels of education, no later than 2015. Result- on track; as per Census 2011, the ratio of female youth literacy rate to male youth literacy rate is 0.91 at an all India level and is likely to reach the level of 1 by 2015.MDG4: Reduce child mortality, Target 5: Reduce by two-thirds, between 1990 and 2015, the under-five mortality Rate. Result—moderately on-track due to decline in recent years it is likely to reach 48 deaths per 1000 live births, missing the target narrowly. Under Five Mortality Ratio (U5MR) was estimated at 125 deaths per 1000 live births in 1990. In order to achieve the target, the U5MR is to be reduced to 42 deaths per 1000 live births by 2015.

MDG5: Improve Maternal Health Target 6: Reduce by three quarters between 1990 and 2015, the Maternal Morality Ratio. In 1990, the estimated MMR was 437 per 1, 00,000 live births. In order to meet the MDG target, the MMR should be reduced to 109 per 1, 00,000 live births by 2015. Result—slow or off-track: As per the latest estimates, the MMR status at all India level is at 167 in 2011–13. As per the historical trend, MMR is likely to reach the level of 140 maternal deaths by 2015; however, assuming the recent sharper decline is sustained, India is likely to be slightly nearer to the MDG target. MDG6: Combat HIV/AIDS, Malaria and other Diseases. Target 7: Result—on track. Have halted by 2015 and begun to reverse the spread of HIV/AIDS. The prevalence of HIV among pregnant women aged 15–24 years is showing a declining trend from 0.89 % in 2005 to 0.32% in 2012–13. Target 8: Have halted by 2015 and begun to reverse the incidence of Malaria and other major diseases. The Annual Parasite Incidence (API) rate—malaria has consistently come down from 2.12 per thousand in 2001 to 0.72 per thousand in 2013, but slightly increased to 0.88 in 2014 but confirmed deaths due to malaria in 2013 was 440 and in 2014, 578 malaria deaths have been registered. In India, tuberculosis prevalence per lakh population has reduced from 465 in year 1990 to 211 in 2013. TB Incidence per lakh population has reduced from 216 in year 1990 to 171 in 2013. Tuberculosis mortality per lakh population has reduced from 38 in year 1990 to 19 in 2013.

MDG7: Ensure Environmental Sustainability—Target 9: Integrate the principle of sustainable development into country policies and programmes and reverse the loss of environmental resources. Result: moderately on track. Target 10: Halve, by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. Results-on track for access to drinking water but slow track for sanitation. During 2012, at all India level, 87.8% households had access to improved source of drinking water while 86.9% households in rural and 90.1% households in urban area had

access to improved source of drinking water. The target of halving the proportion of households without access to safe drinking water sources from its 1990 level to be reached by 2015, has already been achieved in rural areas and is likely to be achieved in urban areas. At an all India level also, the target for access to improved sources of drinking water has already been achieved. Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers. Results—The pattern is not statistically discernible. MDG8: Develop a global partnership for development, Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially information and communication. The overall tele-density in the country has shown tremendous progress and is at 76% as on 31st July 2014. The internet subscribers per 100 population accessing internet through wireline and wireless connections has increased from 16.15 in June 2013 to 20.83 in June 2014 coverage. Result—on track.

These MDGs are definitely a progressive development but may lead to a false impression concerning the health of those living in India. What needs to be emphasised are sustainable goals when planning the next 15 years [30,31]. The way forward in identifying the optimal targets and costs is hotly contested [31]. The reality is that 400 million still earn less than $1.25 per diem, infant mortality [32] is high, as are maternal deaths [33], progress on improved sanitation is poor [34], and any law banning defecation in the open [34] has not been passed in contrast to Sri Lanka and Bangladesh. Despite the aforesaid successes, The Ministry of Statistics in India which monitors the MDG programme points to the fact that only 6 out of 18 targets have been fully met [35].

3.2. Social therapy through inspiration: The role of women in society; agriculture, medicine, family welfare, ownership

Over 650 million of India's 1.3 billion inhabitants, being female, many of whom do not have effective voices, with notable exceptions e.g. Indira Gandhi [36] ("I am alive today, I may not be there tomorrow... I shall continue to serve until my last breath and when I die, I can say, that every drop of my blood will invigorate India and strengthen it."). Another is Dr Vanaja Ramprasad, Founding Director of Foundation for Genetic Resource, Energy, Ecology and Nutrition, Former Board member of International Federation of Organic Agricultural Movement, Bangalore, Karnataka who is the Founder trustee of the Green Foundation [37] which began with women in the small village of Thalli trying to help small scale and marginal farmers. This led to the formation of the Janadhanya society [37] of small farmers who developed their agricultural entrepreneurial skills to improve linkage to market outlets for their produce. Through empowerment of women in agriculture with effective communication, their voice could be heard in government (anti-GMO lobby to Prime Minister Manmohan Singh in November 2013 [38]) and informing them of their political rights with respect of impact to 'changes' in policy and their objectives through sustainable agriculture, their activities in conservation through agro-biodiversity in *in situ* gardens and farms and *ex-situ* gene seed banks, cross disciplinary activities, and the preservation of indigenous knowledge. In a sense, the

Janadhanya farmers exercise a form of social therapy because they develop positive interactions with others, at home, at school, at work, and with cross-disciplinary peers improving their health, self-worth and wellbeing. This "therapy" exercised through the society helps to allay anxiety and stress and regulate their lives in a more harmonious manner and build bridges with others.

The Green Foundation and Janadhanya Farmers Federation participated in the KISAN Fair [37] that was held at Bangalore International Exhibition Centre in 2015. This event was supported by Ministry of Agriculture, Govt. of India and Department of Agriculture and its remit included the conservation of local seed diversity, promotion of an increased reliance on biodiversity-based ecological agriculture for endogenous growth and development of rural communities. Agricultural departments should educate farmers to curb the indiscriminate use of agrochemicals (insecticides, fungicides, herbicides), because, besides being residues on fruit, some agrochemicals get washed with rainwater into rivers and harm the fish and key benthic and aquatic organisms. They should also encourage the growth of food and fruit preservation industries to avoid/reduce food wastage, particularly in summer.

The remit of this fair was to create a gender-sensitive environment that enhances women's leadership skills; contribute to livelihoods by creatively marketing "value-added" cultivated and wild agricultural biodiversity; by connecting the natural elements—soil, water, air, sunlight, and seed to ensure an abundance of nutritious food and other basic community needs; continue to nurture community participation and assist in building robust community institutions- i.e. connectivity. The promotion of such activities is likely to improve the wellbeing and happiness of the Indian peoples both now and in the future.

3.3. Connectivity and non-communicable diseases (NCD)

India has made significant progress e.g. leadership as in the establishment of the National Programme for Prevention and Control Of Diabetes, Cardiovascular Diseases and Stroke (NPDCS) [39], and the National Rural Health Mission (NRHM) [40] and Public Health Foundation of India [41]. Notable institutions taking up the challenge include The Indian Council for Medical Research (ICMR), the National Institute of Communicable Diseases, the All India Institute of Medical Sciences (AIIMS) and the aforesaid PHFI.

In the context of connectivity, in November 2004, initially funded by the World Bank, the Integrated Disease Surveillance Project (IDSP) was set up under the Ministry of Health and Family Affairs to engage in infectious diseases arising within the community to identify outbreaks [42]. Thus, from out-patient and in-patient care facilities, using WHO methodology, aggregated data is accumulated using relatively high technology, e.g. computerization, GIS, and video conferencing links for communication and training. The project established units in all states and unusual trends in disease occurrence are investigated by rapid response teams. The National Institute for Communicable Diseases now renamed as The National Centre for Disease Control [39] is/has

addressed key issues. Firstly to promote surveillance through major hospitals (both in public and private sectors) and active surveillance through health system staff and community; secondly, build capacity for data collation, analysis, and interpretation to recognize warning signals of outbreak, and instigate public health action; thirdly, allow availability of quality test kits at district and state laboratories, etc. at identified laboratories and establish a national training program to obtain high quality medical data; fourthly, develop an appropriate quality assurance program which can be implemented throughout the project; and fifthly, to establish a high-technological infrastructure to support these aims and objectives through good quality data vital for planning needs.

3.4. Strategic thinking: initiatives, monitoring progress realistic targets (e.g. NCDs) and deliverables

The answers sought, are in part embodied in the MDG "results" section. However, great debates have arisen appraising the MDGs and synthesising targets which are not unanimously agreed upon. This is a monumental task and without access to the data, and additional experts in the field, the authors can only cite a report [31] as a stepping stone to achieving and cultivating connections and inspiring solutions for healthy living.

3.5. NGOs: Building Families and Networks

For example, The International College of Nutrition [43] has endeavoured to build families through municipal authorities and the need for good programmes whencesoever they come (e.g. the work of R.B. Singh through the Director: Inspector—General of Moradabad ("Healthy diet and exercise [44]"), "Yes! (Youth Empowerment & Skills Workshop"; "Art of Living programme")), and through conferences, workshops, and seminars, particularly in South East Asia and has promoted education in schools through its Board Members e.g. RBS. The Public Nosegay School Moradabad is just one example which continues their work slowly linking with other schools in India and have shown their appreciation of a WCCN seminar (RBS & DWW) to the whole school in Moradabad on 'Fast Food and Health' *q.v.* their literal response by email was as follows:

"Dear Sir,

We Nosegay school family miss you always student are following your instructions. Some students has done bye-bye to fast food. They criticise fast food and says others not to have fast food .Your slide show is memorable…...

Best Regards. Neeraj Kumar Nosegay School Family."

We emphasised togetherness in this fight against cardiovascular diseases through food choices and they joined our cause (Unus pro omnibus, omnes pro uno) and metaphorically joined hands in a circle to avoid the Adam Smith [45] bottom up structure where those at the bottom tier could not see the end product. In this paper we present *inter alia* the need for a regional and national integrated

structure comprising faculty [senior investigators down the line to trainees], infrastructure [Clinical Research Facilities (centres and units) and (Clinical Research Networks)], research [(schools and programmes)], and systems [(Research Information) and (Faster and easier clinical research)] to reduce cardiovascular and related diseases. Reduction and the use of salt and sugar consumption was emphasised to guard against hypertension and obesity [46]. Indeed sugar-loaded soft drinks should be prohibited in schools and purchases of same from nearby retail shops discouraged. We agree with the comments made by Balarajan et al. [47] about 'Benchmarks for Fairness' but this necessitates, where resources are limited, a need to prioritise health care issues not only with health per se but to achieve a "close-to-fairness" outcome one must consider supply and demand and the central role of government, state, the community, and private financing. The development of such networks is difficult globally, and in India, and beyond the scope and experience of these authors. At an individual, family network level, intergenerational equity should be sought through community networking.

We guarded against research folly and championed the statue of David by Michelangelo [48], or indeed their erstwhile hero, Tenzing Norgay [49]. In simple terms we explained the importance of reflective dialogue when deep listening or asking powerful questions to generate meaningful actions on a healthy diet comprising antioxidants, vitamins, minerals and fibre, fruits, vegetables, green vegetables, seeds, eggs and honey, fish, and wild meat (*cf.* pre-agricultural human diet) and essential amino acids and minerals [50].

Within the urban area where many school pupils live and journey along the way to school, however travelled, it was the proximity of food and drink outlets that would try and beguile the well-intentioned pupil from consumption of healthy foods The disposition of such outlets could be mapped as a GIS project [51]. Planners of urban areas in future years could think of planted park areas with trees that trapped dust and sound, and provided a pleasantly humid environment [52].

3.6. GIS and planning permission. ecological epidemiology

Continuing with the narrative, the topic of ecological epidemiology was raised diagrammatically, similarly to FitzGerald et al [53] as four flattened concentric circles radiating outward from a common origin, the first being the activities of the individual (dietary and physical activity) with demographic factors, knowledge and skills, gene-environment interactions, psychosocial factors, etc. The second overarching circle was the environmental setting such as homes, schools, workplaces, retail outlets, recreational facilities, etc. The third circle was the sectors of influence viz. government, public healthcare systems, media, agriculture, industry, financial institutions, etc. Finally, the fourth circle comprised social and cultural values which included religion, beliefs, heritage, lifestyle, etc. Thus the methodology and framework are available to ecological epidemiologists; only the will of government, finance and governance is needed combined with sound education for the stakeholders.

Particular attention was focussed on food access and pricing [54], advertising [55] and location of supermarkets [56] for pregnant women [57], design of supermarkets especially from both a pathway and shelving perspective and the need to use an "App" to direct the customer to a healthy food option [58] which could be done cleverly for mutual customer/owner benefit especially if the owner developed a larger market share than competitors. After all, in 2014, India used *c*1 billion mobile phones exceeded only by China 1.25 billion and 32% of Indians live in urban areas so the potential for healthy living through proper dietary consumption is enormous.

3.7. Transgenesis, epigenetics, foeto-placental development and lifetime risk of Non-Communicable Diseases such as cardiovascular disease, Type 2 diabetes, Metabolic Syndrome, etc

Results for this section are partially described by these authors elsewhere [26]. Though perhaps not a high priority at present (and in the absence of detailed discussion on environmental toxicants), future generations will continue to have an adverse health risk. Future families could be affected by dietary constituents [26] such as phyto-oestrogens [59–61] and xeno-oestrogens [62] e.g. bisphenol-A, pesticides, herbicides, fungicides, phthalates, etc.; and a myriad of phytochemicals: transferring adverse or transgenic material from mother or father or both and acting in utero or via lactation to affect the baby. This may increase the risk of sexual dimorphism in the pre-optic area or anteroventral periventricular nucleus [63] as indicated by the fall in sexually dimorphic nucleus (SDN) cell numbers (apoptosis) from that of an early childhood baby with subsequent sexual behavioural activities. It may also lead to an increased lifetime risk in breast and prostate cancer. The WCCN advocates that prevention/intervention of cardiovascular and related diseases may be achieved through a palaeolithic-style omega-3 rich diet supported by epidemiological evidence ((e.g. Kuna indians low BP and flavonoids [64]–cocoa) [65], Ayurvedic diet (reasoning and seasoning: curcumin) [66]), timing of dietary intake (parental and individual)). It may achieve its aims, inter alia, through the development of instruments (e.g. questionnaires) to understand the global epidemic in cardiovascular diseases and environment/dietary changes influencing mind-body interactions through epigenetic and other mechanisms, and suggest policy-making guidance that changes the social, clinical and scientific world to meet a global target of reducing 25% of cardiovascular mortality by 2025 [64,67,68] in line with the World Health Foundation, and related disease categories. A worrying development is the rising prevalence of dementia, particularly in the Western World where, for example, in England and Wales, dementia is the leading cause of death in women ahead of cardiovascular disease with men which is escalating fast as reported by the BBC based on data from the Office of National Statistics [69].

3.8. (Narendra) Modicare

Difficulties implementing such a plan concern a shortage of healthcare staff and training despite the considerable medical training centres that exist. The shortfall in specialists; and the need to

implement diagnostic testing and associated testing technologies, etc., is crucial if targets for healthy living are to be met. Traditional non-allopathic Indian medicines [70] will receive attention, and will relate in context to potential healthy living, even for the poor.

Indian states with the aforementioned/implied visionary connections may transform India's medical needs for all in the coming years. Ten years from now, the assessment of change can determine if change has substantially occurred and by modelling such change important risk factors for improved health for all may be gleaned. India's diversity will continue to be manifest in regional health systems for some years to come.

4. Discussion

There is always a danger that *Caecus caeco dux* (the blind leader of the blind) puts forth arguments in the realm of public health and nutrition because knowledge of the social sciences, humanities e.g. history, geography, anthropology, sociology, economics, and other schools of thought, may be relatively lacking, such as the importance of food outside of nutrition which have a potential impact on healthy living, important to the work of NGOs, government agencies, the private and community sectors and the UN (*vide supra*), which are important to policy making bodies and institutions. One has to view food in the context of different frameworks, which is key to policy makers and will differ with global location. For example, the authors have discussed fish supplies in the context of food as a nutrient in India but dwindling fish stocks are destroying livelihoods and decimating the industry [71] and having a major impact on healthy living. So in this case food connotes different aspects of investigation. This is not a picayune issue. In the US (not a signed-up member of Nagoya protocol) flavour and fragrance industry is likely to grow to a $26 billion industry by 2020 and 25% of the pharmaceutical industry, containing a plant ingredient, will grow to $1.3 trillion by 2018 and India could benefit by sharing within its community more of such types of wealth [72,73] subject to investment and not hindered by delays in contractual agreements [74].

It is important that wealth is shared rather than exploited by multi-national companies and institutions. To this end, India has joined up to the Nagoya protocol, as reported in 'The Hindu' based on an interview with Environment Minister Jairam Ramesh and published officially [75].

At a macro-economic level, under Modicare, the Indian Government will be the major purchaser of health care services in India and the people will be its customers unless they opt out for better services. Consequently, the private sector will have to re-configure their model.

Private sector healthcare providers, therefore, will have to reconfigure their business models. At present healthcare services are approximately a $40 billion (Rs2,50,000 crore) industry of which the private sector has 70–80% of the business. Pricing for medical services is largely controlled by the private sector but under a national health programme tougher negotiations will ensue, and will probably lead to improved cost-benefit to the nation. Another key issue is the quality of health care in India [76] which is difficult to measure and ranges from amongst the best in the world to that of an unacceptable level.

Take for example the ticking time bomb of dementia: in many states there is a very low literacy rate and tools to estimate the prevalence are difficult to apply. In general, the quality of dementia research, though improving, is still inadequate and requires the interaction of government and non-government organisations in the community, e.g. in Kerala, as in the West there is a trend for the elderly to become isolated in their community, and loneliness and mental health become important issues whilst their younger family member seek employment in the urban areas [77]. At a community level, the caregivers also need health service support [77] in their loving task [78] who have significant co-morbidity [79]. The social challenges on the other hand are complemented by advanced research. For example, neuroimaging studies e.g. 140 patients (> 60 y) with vascular dementia and gender-matched controls took part in a study of vitamin D, which is important in brain function, provided evidence [80] from serum 25-hydroxy vitamin D concentrations that there was an association of vitamin D with vascular dementia arising from cerebral small vessel disease in an Asian Indian population; similarly BP. Thus screening for vitamin D and high BP may, by intervention, reduce the risk of vascular dementia.

5. Conclusions

We have chosen examples and inferred models that identify the need for cultivating connections and inspiring solutions for healthy living but it will take The Expert Panel for the 2030 programme to set their sustainable development targets for India through consultation with, and evaluation by, all sectors of government and the community based on quality research in all aspects of health care services and integrated disciplines such as the pharmaceutical industry and the Nagoya protocol.

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Conflict of Interest

All authors declare no conflicts of interest in this paper.

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